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of New Zealand, over the same route followed so many generations ago by the Maori warriors.

James Mackintosh Bell,
Director of the Geological Survey of
New Zealand.

Wellington, 30th September, 1905.

MAPS OF MEXICO.

BY

F. J. H. MERRILL.

The person who, through scientific or commercial interest, seeks accurate cartographic information about Mexico,—or, indeed, accurate information about Mexican maps—meets with many difficulties. Libraries, as a rule, do not consider it important to keep in touch with the progress of maps and map-making; book-sellers handle only those maps which are made known by advertising and yield a liberal profit in handling, and commercial map-publishers can make a large profit from an untrained public by putting new dates on old map-plates. The inquirer, therefore, after wasting some time, ascertains that the preparation and publication of accurate maps has become a branch of Government work in Mexico, as in many other countries, and that information must be obtained from the Government Bureau in charge.

Our sister Republic, with its enormous extent of unsettled territory, is pushing to completion, as rapidly as possible, its topographic survey, which has been in progress more than twenty years, and will, in time, result in covering its territory with a series of sheets on the scale of 1:100,000, each including about 15′ of latitude and about 30′ of longitude.

As these will be, for a long time to come, the only accurate maps for the use of the public, a brief description will be of interest. The official key map shows the following divisions and prospective series: A. Nine sheets on the scale of 1:2,000,000, designated by large Arabic numerals. B. Twenty-four sheets on the scale 1:1,000,000, designated by small Arabic numerals from 1 to 24, beginning at the N. W. corner. C. Ninety-six sheets on the scale of 1:500,000, each of the sheets of series B being divided into four equal parts, designated by Roman numerals from I to IV. Of this series, about 20 sheets fall outside the boundaries of the Republic. D. Each sheet of series C is divided into 25 quadrangles on the scale of 1 :100,000, designated by letters, and this base, with 50 meter contours, is the present base of general publication. On this scale 10 mm. = 1 kilometer or 1 mile = .633 inch.

The sheets measure 40 cm. x 53 cm., and are of uniform size for all the different scales. They are laid out in an arbitrary system of distribution, without especial reference to latitude or longitude, but with one sheet centring on the City of Mexico. The meridian of the east tower of the cathedral of the City of Mexico, which is 6 h., 36 m., 21.05 sec. West of Greenwich or in longitude 99° 5′ 15″ W., is the prime meridian of the Republic, and forms the centre line of one column of these sheets, so that east and west of the Mexico City sheet, known in the series as 19. I. M., the adjoining sheets begin approximately at long. 0° 15′ E. and 0° 15′ W., terminating approximately at long. 0° 45′ E., 0° 45′ W. respectively, including a rectangle 24.8 m. by 34.7 m. with an area of 860.6 sq. miles.

These maps are published and sold by the Seccion de Cartografía of the Ministerio de Fomento, in the City of Mexico, the price being 70 cts. Mexican per sheet. Up to January, 1906, 128 sheets had been issued, covering different parts of the Republic. Eleven of them are in Sonora, the others are mainly in a zone lying toward the Gulf of Mexico and extending from the Rio Grande to the Isthmus of Tehuantepec. They are well engraved and printed in three colours —culture in black, drainage in blue, and contours in brown. Their chief fault is the very large contour interval, 164 ft. For the mountain districts this is fairly satisfactory, but, in a relatively level country, it falls far short of meeting the public needs. It is also to be regretted that none of the contours are numbered as to altitude, and, further, that scales of English miles and Spanish leguas are not shown on these sheets; for they are used by many English-speaking people, who always estimate distance in miles, while the average native Mexican has no other measure of distance than the legua or league.

A matter of serious importance regarding the Mexican topographic sheets is the difficulty of obtaining information concerning them. The only New York library open to the public possessing a set is that of the American Geographical Society, and this was acquired by purchase. In the library of the U. S. Geological Survey are but 38 of the 128 sheets said to be issued. Few of the people who need to use them have ever heard of them, and lists of the maps already published cannot be had without writing to the office of publication.

With the growing investment of American capital in Mexico, and the increasing need for these maps by people who do not live there, it would seem that the Mexican Government should recognize the importance of placing sets of them in public libraries in the principal American cities, with full information concerning them. In this way the double purpose would be served of enabling many who need these maps to obtain them and of greatly increasing their sale. It is manifest to all who are familiar with commercial conditions in Mexico that these valuable sheets will not fulfil their utmost measure of usefulness if their sale is restricted to those persons who live near the City of Mexico. At Hermosillo, the capital of Sonora, the writer found it impracticable to obtain copies of these maps, although eleven sheets had been surveyed in Sonora and published.

Pending the completion of this topographic survey, a person requiring a map is much in need of general compilations of existing information. The Secretaría de Fomento issues from time to time editions of a general map of the Republic on the scale of 1 :2,000,000, or 31.6 m = 1 in., which probably express the best available information. One of these was issued in 1890 in the name of General Carlos Pacheco. It was engraved in Paris by Erhard Bros., showing surface configuration by hachures in brown, and is a very handsome map. A second was published in 1894 in the name of Manuel Fernandez Leal, compiled by Engineer I. Molina, and a third in 1899 under the same authorship. The last bears the imprint of LeCocq, Paris, and shows topography in a brown tint. It is a great advance over any previous issue, and is probably the best existing general map of Mexico. It has the specially good feature of showing in red all points located by their co-ordinates of latitude and longitude. It would appear from this that almost no work has been done in astronomical survey of the State boundaries, and therefore, their locations are, in most cases, probably not exact.

A point in which all Mexican maps which have come to the writer's notice seem to fail is in the accurate location of the mining camps, this being specially true of the topographic sheets. At the present time, when the development of many parts of the Republic is so largely dependent on the encouragement of the mining industry, it would appear that to locate these mines, or groups of mines, were a matter of urgent necessity. Surely the position of a mining camp producing thousands of dollars monthly is more important commercially than the location of some little village where practically no business is transacted, and of which the male inhabitants have no other means of livelihood than working in the mines a few miles distant. Yet this distinction is everywhere made.

No American maps of Mexico are wholly satisfactory. Probably the best is that compiled by M. Hendges and issued in 1900 by the Bureau of the American Republics at Washington, D. C. This shows with some accuracy the location of a considerable number of mining camps, in many cases indicating the character of their mineral product. Its scale is 1:3,168,000, or 50 miles to 1 inch, and its size is very convenient for a general map; but its usefulness is much impaired by a brown lithographic tint intended to show topographic relief. The purpose aimed at is not attained with any degree of accuracy, and legibility is much obscured by a lithographic error which has been made in printing the brown topography over the black culture and drainage, instead of the black over the brown, while the cost of manufacture is increased by an extra color. The details of drainage on this map differ considerably from those of the Leal map of 1899. It also makes the error of stating that the meridian of Mexico City is 99° 11′ 36″ W. of Greenwich, instead of 99° 05′ 15″. If the Hendges map were brought up to date and printed without the brown topographic tint it would be most satisfactory.

The other best-known American map is that of Rand & McNally. While of convenient size, on the scale of 72 m. = 1 inch, the base is obscured by an attempt to show mountain relief in black hachures, which interfere much with the legibility of the names and cannot by any possibility be correct. The interference is more evident on the folded maps, which are printed on uncoated paper, than in the atlases, which are on coated paper. This map without hachures would be much more valuable.

The experience of years of map-making by the best engravers of the world has established the fact that to show topography accurately by hachures involves not only accurate information, but very careful and expensive engraving. The work of the British Ordnance Survey and of our own Coast and Geodetic Survey is of the highest order in this respect. Where information is uncertain and economy is an object, attempts to show topography were better suppressed and the details of the map confined to drainage, the location of points of importance, and of lines of transportation, such as railroads, wagon roads, mule paths and canals. It should always be borne in mind that the frequent attempts to show topography by hachures in commercial maps are generally inaccurate and misleading.

The most perfect small-scale map of Mexico, showing by hachures the general features of its relief, is in Stieler's Handatlas, edition of 1904. The scale is 1:7,500,000, or about 118 m. to 1 inch; and as it can be bought separately at 20 cents a copy, it should be in the possession of every one interested in the topography of Mexico. Another topographic map of much interest is contained in a work entitled Le Mexique au Début du XXème Siècle, published by Ch. Delagrave, Paris, 1904. It is on the scale of 1:5,000,000, and shows relief in contours with an interval of 500 to 1,000 meters and with the successive zones in different shades of colour. This work contains, also, a small mineral map on the scale of 1:10,000,000, by A. de Launay, aiming to show by coloured conventions the location of the various mineral deposits. Its small scale, however, interferes somewhat with its usefulness.

Fairly accurate large-scale maps of the Mexican States are contained in an atlas compiled and published by Sr. Antonio García Cubas, Mexico, 1884. This work gives also a list of the mining camps in each State and considerable information concerning mineral resources.

There are probably numerous other maps of the various States, but only a few are known to the writer. A good map of Sonora is issued by C. E. Herbert, Nogales, Arizona; but does not include the results of the topographic survey.

Since the beginning of the present year, a new Map of Sonora and Baja California, on the scale 1:750,000 or about 12 miles to the inch, has been issued by Mr. Max Bohmer of Hermosillo. This Map has been compiled with much care and includes the data as to culture and drainage contained in the topographic sheets surveyed by the Mexican Government in Sonora. The boundaries of the various districts are shown with much greater accuracy than in any previous map, and considerable pains have been taken in locating the various Mining Camps. No attempt has been made to show mountain ranges by hachures, and so the reader is spared the bewilderment usually produced by the ordinary, necessarily inaccurate attempt in this direction. The map was made at Hamburg, Germany, at the Geographical Lithographic Establishment of J. Köhler. The clearness of its execution, the legibility of its lettering and the softness of its coloring leave nothing to be desired.

A fairly large map of Sinaloa was engraved by Edward Stanford, of London, and a very carefully-executed map of Sinaloa by F. G. Weidner, on the scale 1:1,500,000, showing mining camps and geology, is found in *Petermanns Mittheilungen,* Vol. XXX, p. 84.

Sr. García Cubas in 1882 issued a dictionary of geographic names, and a catalogue of places in Mexico, arranged alphabetically and giving the municipality, district, and State in which each place is situated, was published in 1898 by the Dirección General de Estadística of the Secretaría de Fomento. The Anuario de Estadística issued by the same department contains tables of astronomical positions and statistics of mineral production.

Geologic maps of Mexico are not numerous, and at present are not obtainable from official sources, though it is promised that a new one will soon appear with Bulletin 18 of the Instituto Geológico de México.

In 1899, Sr. Antonio del Castillo published a preliminary geologic map on the scale of 1 :3,000,000; in which year also appeared the second edition of his *Carta Minera,* which shows the mining camps of the several States on the scale of 1 :2,000,000. This map represents a vast amount of labour in compilation, and is doubtless as accurate as the state of information concerning the camps will permit, for only a few of them have been accurately located. A later geologic map on the scale of 1 :8,000,000 appeared in the Boletín del Instituto Geológico de Mexico, No. 6, published in 1897.

The Carta Minera of Sr. del Castillo has been in part replaced by the small-scale map of Sr. Luis Salazar in the Trans. Am. Inst. Mining Engineers, Vol. XXXII, p. 303. This map does not, however, reproduce all the camps located by del Castillo.

A general map of some interest is that entitled Carta de Comunicaciones de los Estados Unidos Mexicanos, on the scale of 1 :1,000,000, or 15.8 m. = 1 in., compiled by Colonel Bodo von Glümer and published in 1895-6 by the Secretaría de Estado. It corresponds to our U. S. post-route maps, and shows mail routes and telegraph and telephone lines.

A discussion of maps of Mexico would be incomplete without mention of the map of New Spain compiled by Humboldt in 1804 (published in 1812). It is on the scale of 56 miles to the inch, is well engraved, and shows the position of the mining camps with such accuracy as was possible and with a clearness which puts to shame all modern attempts of a similar character. This map is in the Atlas of New Spain, and may be seen in most of the larger public libraries.

In view of the necessarily slow progress of the topographic survey in covering the whole of the Mexican Republic, the writer would call attention to the fact that nearly every mining engineer residing in its territory could add to the sum of accurate geographic knowledge by determining the latitude and longitude of his camp. With the modern engineer's transit, latitude can be determined with an error not greater than 1′, or 6,000 ft. As a rule, camps are known as so many hours' ride in a certain direction, but their exact position is never determined.

RECENT ARCHÆOLOGICAL DISCOVERIES IN NORTH-WESTERN AMERICA.*

BY

HARLAN I. SMITH.

The explorations, of which a summary is now presented, were made in the village sites and graves of the southern interior of British Columbia and the interior of Washington; in the shell-heaps and cairns of the coast of Washington and British Columbia; and in the sites along the Columbia River between Portland and the coast.

It is found that the material culture of the prehistoric people was similar to that of the Indians now inhabiting the regions, and that the influence of one culture upon another was greater in earlier times.

The culture of interior southern British Columbia was found to be a unit; that of the coast constituted another unit, and in Central Washington was a culture differing in some respects from that of the interior of southern British Columbia and also unlike that of the coast. The remains in the Lillooet Valley showed influences of the coast as well as of the interior.

The southern interior of British Columbia is arid and the winters are cold. Vegetation is scanty, and, except on the highlands, there are few trees. The prehistoric inhabitants, like the Salish Indians to-day, relied upon many limited resources. They had the salmon from the rivers, besides the deer and the elk, which furnished food and clothing, with bones and antlers for tools and implements. The bark of the sage-brush supplied a fibre for cloth, and many domestic articles were made of stone.

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* The archæological investigations here described were undertaken in 1897–1899 for the Jesup North Pacific Expedition, and in 1903 for the American Museum of Natural History. The results of these expeditions are being published in the Memoirs of the American Museum of Natural History under the supervision of Dr. Franz Boas, who directed the whole work of the Jesup North Pacific Expedition. The specimens collected and the photographs taken are deposited in the Museum.